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5482846

L1: Entry 1 of 1 File: USPT Jun 29, 1999

US-PAT-NO: 5916787
DOCUMENT-IDENTIFIER: US 5916787 A

TITLE: Ethanol production in gram-positive microbes

DATE-ISSUED: June 29, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O'Neal	Gainesville	FL		
Barbosa-Alleyne; Maria D. F.	Gainesville	FL		

US-CL-CURRENT: 435/161; 257/E21.317, 435/162, 435/163, 435/165, 435/252.31, 435/320.1

CLAIMS:

We claim:

1. A Gram-positive bacterium which has been transformed with heterologous genes encoding alcohol dehydrogenase and pyruvate decarboxylase wherein said genes are expressed at sufficient levels to confer upon said Gram-positive bacterium transformant the ability to produce ethanol as a fermentation product.

2. The Gram-positive bacterium, according to claim 1, wherein said host is selected from the group consisting of Bacillus, Lactobacillus, Streptococcus, Fibribacter, Ruminococcus, Pediococcus, Cytophaga, Cellulomonas, Bacteroides, and Clostridium.

3. The Gram-positive bacterium according to claim 2, wherein said host is a Bacillus sp.

4. The Gram-positive bacterium, according to claim 3, wherein said Bacillus sp. is selected from the group consisting of B. subtilis and B. polymyxa.

5. The Gram-positive bacterium, according to claim 1, which has been transformed with Z. mobilis genes encoding alcohol dehydrogenase and pyruvate decarboxylase.

6. The Gram-positive bacterium according to claim 1, wherein said bacterium is further transformed with a gene encoding an enzyme which degrades oligosaccharides.

7. The Gram-positive bacterium, according to claim 6, wherein said enzyme which degrades oligosaccharides is a polysaccharase.

8. The Gram-positive bacterium according to claim 7, wherein said polysaccharase is selected from the group consisting of cellulolytic, xylanolytic, and starch-degrading enzymes.

9. The Gram-positive bacterium, according to claim 1, wherein said heterologous genes are incorporated onto the chromosome of said bacterium.

10. A method for the production of ethanol, said method comprising transforming a Gram-positive bacterial host with heterologous genes encoding pyruvate decarboxylase and alcohol dehydrogenase wherein said genes are expressed at sufficient levels to result in the production of ethanol as a fermentation product.

11. The method, according to claim 10, wherein said host is selected from the group consisting of Bacillus, Lactobacillus, Streptococcus, Fibribacter, Ruminococcus, Pediococcus, Cytophaga, Cellulomonas, Bacteroides, and Clostridium.

12. The method, according to claim 11, wherein said host is a Bacillus sp.

13. The method, according to claim 12, wherein said Bacillus sp. is selected from the group consisting of B. subtilis and B. polymyxa.

14. The method, according to claim 10, wherein said Gram-positive bacterium has been transformed with Z. mobilis genes encoding alcohol dehydrogenase and pyruvate decarboxylase.

15. The method, according to claim 10, wherein said bacterium is further transformed with a gene encoding an enzyme which degrades oligosaccharides.

16. The method, according to claim 15, wherein said enzyme which degrades oligosaccharides is a polysaccharase.

17. A method for reducing the accumulation of acidic metabolic products in the growth medium of Gram-positive bacteria, said method comprising transforming said bacteria with heterologous genes which express alcohol dehydrogenase and pyruvate decarboxylase at sufficient levels to result in the production of ethanol as a fermentation product.

18. A plasmid designated pLOI1500.

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L3: Entry 1 of 1 File: USPT Mar 19, 1991

US-PAT-NO: 5000000
DOCUMENT-IDENTIFIER: US 5000000 A

TITLE: Ethanol production by Escherichia coli strains co-expressing Zymomonas PDC and ADH genes

DATE-ISSUED: March 19, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		
Conway; Tyrrell	Lincoln	NE		
Alterthum; Flavio	Gainesville	FL		

US-CL-CURRENT: 435/161; 257/E21.317, 435/170, 435/252.3, 435/252.33, 435/320.1, 435/488

CLAIMS:

We claim:

1. An Escherichia coli, which has been transformed with Zymomonas mobilis genes coding for alcohol dehydrogenase and pyruvate decarboxylase wherein said genes are expressed at sufficient levels to confer upon said Escherichia coli transformant the ability to produce ethanol as a fermentation product.

2. The Escherichia coli, according to claim 1, wherein the Escherichia coli, prior to transformation, is selected from the group consisting of ATCC 8677, ATCC 8739, ATCC 9637, ATCC 11303, ATCC 11775, ATCC 14948, ATCC 15224, and ATCC 23227.

3. The Escherichia coli, according to claim 1, wherein said Escherichia coli has been transformed with a plasmid selected from the group consisting of pLOI308-10, pLOI297, and pLOI308-11.

4. The Escherichia coli, according to claim 3, wherein said Escherichia coli has been transformed with pLOI297.

5. A method for the production of ethanol, said method comprising transforming an Escherichia coli with Zymomonas mobilis genes coding for pyruvate decarboxylase and alcohol dehydrogenase wherein said genes are expressed by the transformed Escherichia coli at sufficient levels to result in the production of ethanol as a fermentation product when said Escherichia coli is grown in an appropriate medium.

6. The method, according to claim 5, wherein said Escherichia coli is transformed with a plasmid selected from the group consisting of pLOI308-10, pLOI297, and pLOI308-11.

7. The method, according to claim 6, wherein said Escherichia coli has been transformed with pLOI297.

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L2: Entry 1 of 6 File: USPT Dec 25, 2001

US-PAT-NO: 6333181
DOCUMENT-IDENTIFIER: US 6333181 B1

TITLE: Ethanol production from lignocellulose

DATE-ISSUED: December 25, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		
Wood; Brent E.	Gainesville	FL		

US-CL-CURRENT: 435/165; 435/163, 435/170, 435/173.2, 435/173.8, 435/277, 435/278, 435/72, 435/99

CLAIMS:

What is claimed is:

1. A method for producing ethanol from lignocellulose comprising discontinuously treating an aqueous mixture containing lignocellulose, a cellulase and an ethanologenic microorganism with ultrasound under conditions sufficient for hydrolysis of said lignocellulose to occur, to thereby produce ethanol.

2. The method according to claim 1 wherein said cellulase is provided by a cellulase-producing microorganism in said aqueous mixture.

3. The method according to claim 1 wherein said aqueous mixture is treated with ultrasound at a frequency of between about 2 and 200 kHz.

4. The method according to claim 1 wherein said ethanologenic microorganism is an ethanologenic bacteria or yeast.

5. The method according to claim 4 wherein said ethanologenic microorganism is a bacteria or yeast which expresses one or more enzymes which, individually or together, convert a sugar to ethanol.

6. The method according to claim 4 wherein said ethanologenic microorganism expresses enzymes which, individually or together, convert pentose and hexose to ethanol.

7. The method according to claim 4 wherein said ethanologenic microorganism expresses alcohol dehydrogenase and pyruvate decarboxylase.

8. The method according to claim 7 wherein said alcohol dehydrogenase and pyruvate decarboxylase are from Zymomonas mobilis.

9. The method according to claim 4 wherein said ethanologenic microorganism expresses xylose isomerase, xylulokinase, transaldolase, and transketolase.

10. The method according to claim 9 wherein said xylose isomerase, xylulokinase, transaldolase, and transketolase are from Escherichia coli.

11. The method according to claim 9 wherein said xylose isomerase, xylulokinase, transaldolase, and transketolase are from Klebsiella oxytoca.

12. The method according to claim 9 wherein said xylose isomerase, xylulokinase, transaldolase, and transketolase are from Erwinia species.

13. The method according to claim 4 wherein said ethanologenic microorganism expresses alcohol dehydrogenase, pyruvate decarboxylase, xylose isomerase, xylulokinase, transaldolase, and transketolase.

14. The method according to claim 13 wherein said ethanologenic microorganism is a recombinant microorganism expressing Zymomonas mobilis alcohol dehydrogenase and pyruvate decarboxylase wherein said microorganism is selected from the group consisting of Escherichia coli, Klebsiella oxytoca, and Erwinia species.

15. The method according to claim 14 wherein said ethanologenic microorganism is Klebsiella oxytoca P2.

16. The method according to claim 14, wherein said ethanologenic microorganism is Escherichia coli KO11.

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Search Results - Record(s) 1 through 6 of 6 returned.

☐ 1. Document ID: US 6333181 B1

L2: Entry 1 of 6 File: USPT Dec 25, 2001

US-PAT-NO: 6333181
DOCUMENT-IDENTIFIER: US 6333181 B1

TITLE: Ethanol production from lignocellulose

DATE-ISSUED: December 25, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		
Wood; Brent E.	Gainesville	FL		

US-CL-CURRENT: 435/165; 435/163, 435/170, 435/173.2, 435/173.8, 435/277, 435/278, 435/72, 435/99

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. Desc | Image

☐ 2. Document ID: US 6280986 B1

L2: Entry 2 of 6 File: USPT Aug 28, 2001

US-PAT-NO: 6280986
DOCUMENT-IDENTIFIER: US 6280986 B1

TITLE: Stabilization of pet operon plasmids and ethanol production in bacterial strains lacking lactate dehydrogenase and pyruvate formate lyase activities

DATE-ISSUED: August 28, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hespell; Robert B.	late of Peoria	IL		
Wyckoff; Herbert A.	Roscoe	IL		
Dien; Bruce S.	Peoria	IL		
Bothast; Rodney J.	East Peoria	IL		

US-CL-CURRENT: 435/161; 435/252.3, 435/252.33, 435/320.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. Desc | Image

☐ 3. Document ID: US 6130076 A

L2: Entry 3 of 6 File: USPT Oct 10, 2000

US-PAT-NO: 6130076
DOCUMENT-IDENTIFIER: US 6130076 A

TITLE: Ethanol production using a soy hydrolysate-based medium or a yeast autolysate-based medium

DATE-ISSUED: October 10, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		

US-CL-CURRENT: 435/161

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 4. Document ID: US 6102690 A

L2: Entry 4 of 6 File: USPT Aug 15, 2000

US-PAT-NO: 6102690
DOCUMENT-IDENTIFIER: US 6102690 A

TITLE: Recombinant organisms capable of fermenting cellobiose

DATE-ISSUED: August 15, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		
Lai; Xiaokuang	Gainesville	FL		
Moniruzzaman; Mohammed	Gainesville	FL		
York; Sean W.	Gainesville	FL		

US-CL-CURRENT: 431/161; 435/170, 435/189, 435/190, 435/194, 435/195, 435/252.3, 435/254.2, 435/320.1, 536/23.2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 5. Document ID: US 5916787 A

L2: Entry 5 of 6 File: USPT Jun 29, 1999

US-PAT-NO: 5916787
DOCUMENT-IDENTIFIER: US 5916787 A

TITLE: Ethanol production in gram-positive microbes

DATE-ISSUED: June 29, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O'Neal	Gainesville	FL		
Barbosa-Alleyne; Maria D. F.	Gainesville	FL		

US-CL-CURRENT: 435/161; 257/E21.317, 435/162, 435/163, 435/165, 435/252.31, 435/320.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc
Image

☐ 6. Document ID: US 5482846 A

L2: Entry 6 of 6 File: USPT Jan 9, 1996

US-PAT-NO: 5482846
DOCUMENT-IDENTIFIER: US 5482846 A

TITLE: Ethanol production in Gram-positive microbes

DATE-ISSUED: January 9, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O'Neal	Gainesville	FL		
Barbosa-Alleyne; Maria D. F.	Gainesville	FL		

US-CL-CURRENT: 435/161; 257/E21.317, 435/163, 435/252.31

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc
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L2: Entry 6 of 6 File: USPT Jan 9, 1996

US-PAT-NO: 5482846
DOCUMENT-IDENTIFIER: US 5482846 A

TITLE: Ethanol production in Gram-positive microbes

DATE-ISSUED: January 9, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O'Neal	Gainesville	FL		
Barbosa-Alleyne; Maria D. F.	Gainesville	FL		

US-CL-CURRENT: 435/161; 257/E21.317, 435/163, 435/252.31

CLAIMS:

We claim:

1. A Gram-positive bacterium selected from the group consisting of Bacillus subtilis and Bacillus polymyxa which has been transformed with Zymomonas mobilis genes encoding alcohol dehydrogenase and pyruvate decarboxylase, wherein said genes are expressed at sufficient levels to confer upon said Gram-positive bacterium transformant the ability to produce ethanol as a fermentation product.

2. A method for the production of ethanol, said method comprising:

a) transforming a Gram-positive bacterial host selected from the group consisting of Bacillus subtilis and Bacillus polymyxa with Zymomonas mobilis genes encoding alcohol dehydrogenase and pyruvate decarboxylase, wherein said genes are expressed at sufficient levels to result in production of ethanol as a fermentation product, and

b) growing said bacterial host so that ethanol is produced.

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Search Results - Record(s) 11 through 20 of 37 returned.

☐ 11. Document ID: US 20020034816 A1

L5: Entry 11 of 37 File: PGPB Mar 21, 2002

PGPUB-DOCUMENT-NUMBER: 20020034816
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020034816 A1

TITLE: Ethanol production

PUBLICATION-DATE: March 21, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Green, Edward	Surrey		GB	
Javed, Muhammad	Essex		GB	
Baghaei-Yazdi, Namdar	London		GB	

US-CL-CURRENT: 435/252.31; 435/485

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 12. Document ID: US 20010032342 A1

L5: Entry 12 of 37 File: PGPB Oct 18, 2001

PGPUB-DOCUMENT-NUMBER: 20010032342
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20010032342 A1

TITLE: Modified ribulose 1,5-bisphosphate carboxylase/oxygenase for improvement and optimization of plant phenotypes

PUBLICATION-DATE: October 18, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Stemmer, Willem P.C.	Los Gatos	CA	US	
Subramanian, Venkitswaran	San Diego	CA	US	
Zhu, Genhai	Sunnyvale	CA	US	
Liu, Lu	Redwood City	CA	US	
Selifonov, Sergey A.	Los Altos	CA	US	

US-CL-CURRENT: 800/298; 435/440, 800/278

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc
Image

☐ 13. Document ID: US 6541621 B1

L5: Entry 13 of 37 File: USPT Apr 1, 2003

US-PAT-NO: 6541621
DOCUMENT-IDENTIFIER: US 6541621 B1

TITLE: Hypoxia inducible promoter

DATE-ISSUED: April 1, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hodges; Thomas K.	West Lafayette	IN		
Huq; Enamul	El Sobrante	CA		
Hossain; Anwar	Dhaka			BD

US-CL-CURRENT: 536/24.1; 435/320.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc
Image

☐ 14. Document ID: US 6485947 B1

L5: Entry 14 of 37 File: USPT Nov 26, 2002

US-PAT-NO: 6485947
DOCUMENT-IDENTIFIER: US 6485947 B1

TITLE: Production of lactate using crabtree negative organisms in varying culture conditions

DATE-ISSUED: November 26, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Rajgarhia; Vineet	Minnetonka	MN		
Hatzimanikatis; Vassily	Minneapolis	MN		
Olson; Stacey	Minneapolis	MN		
Carlson; Ting	Dayton	OH		
Starr; John N.	Chaska	MN		
Kolstad; Jeffrey J.	Wayzata	MN		
Eyal; Aharon	Jerusalem			IL

US-CL-CURRENT: 435/139

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc
Image

☐ 15. Document ID: US 6333181 B1

L5: Entry 15 of 37 File: USPT Dec 25, 2001

US-PAT-NO: 6333181
DOCUMENT-IDENTIFIER: US 6333181 B1

TITLE: Ethanol production from lignocellulose

DATE-ISSUED: December 25, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		
Wood; Brent E.	Gainesville	FL		

US-CL-CURRENT: 435/165; 435/163, 435/170, 435/173.2, 435/173.8, 435/277, 435/278, 435/72, 435/99

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 16. Document ID: US 6306639 B1

L5: Entry 16 of 37 File: USPT Oct 23, 2001

US-PAT-NO: 6306639
DOCUMENT-IDENTIFIER: US 6306639 B1

TITLE: Genetically modified cyanobacteria for the production of ethanol, the constructs and method thereof

DATE-ISSUED: October 23, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Woods; Robert Paul	Markham			CA
Coleman; John Robert	Markham			CA
Deng; Ming De	North York			CA

US-CL-CURRENT: 435/252.3; 536/23.1, 536/23.2, 536/24.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 17. Document ID: US 6280986 B1

L5: Entry 17 of 37 File: USPT Aug 28, 2001

US-PAT-NO: 6280986
DOCUMENT-IDENTIFIER: US 6280986 B1

TITLE: Stabilization of pet operon plasmids and ethanol production in bacterial strains lacking lactate dehydrogenase and pyruvate formate lyase activities

DATE-ISSUED: August 28, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hespell; Robert B.	late of Peoria	IL		
Wyckoff; Herbert A.	Roscoe	IL		
Dien; Bruce S.	Peoria	IL		
Bothast; Rodney J.	East Peoria	IL		

US-CL-CURRENT: 435/161; 435/252.3, 435/252.33, 435/320.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

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☐ 18. Document ID: US 6130076 A

L5: Entry 18 of 37 File: USPT Oct 10, 2000

US-PAT-NO: 6130076
DOCUMENT-IDENTIFIER: US 6130076 A

TITLE: Ethanol production using a soy hydrolysate-based medium or a yeast autolysate-based medium

DATE-ISSUED: October 10, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		

US-CL-CURRENT: 435/161

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

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☐ 19. Document ID: US 6107093 A

L5: Entry 19 of 37 File: USPT Aug 22, 2000

US-PAT-NO: 6107093
DOCUMENT-IDENTIFIER: US 6107093 A

TITLE: Recombinant cells that highly express chromosomally-integrated heterologous genes

DATE-ISSUED: August 22, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		
Ohta; Kazuyoshi	Gainesville	FL		
Wood; Brent E.	Gainesville	FL		

US-CL-CURRENT: 435/440; 257/E21.317, 435/252.3, 435/252.33, 536/23.7, 536/24.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 20. Document ID: US 6102690 A

L5: Entry 20 of 37 File: USPT Aug 15, 2000

US-PAT-NO: 6102690
DOCUMENT-IDENTIFIER: US 6102690 A

TITLE: Recombinant organisms capable of fermenting cellobiose

DATE-ISSUED: August 15, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		
Lai; Xiaokuang	Gainesville	FL		
Moniruzzaman; Mohammed	Gainesville	FL		
York; Sean W.	Gainesville	FL		

US-CL-CURRENT: 431/161; 435/170, 435/189, 435/190, 435/194, 435/195, 435/252.3, 435/254.2, 435/320.1, 536/23.2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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Search Results - Record(s) 21 through 30 of 37 returned.

☐ 21. Document ID: US 5932456 A

L5: Entry 21 of 37 File: USPT Aug 3, 1999

US-PAT-NO: 5932456
DOCUMENT-IDENTIFIER: US 5932456 A

TITLE: Production of ethanol and other fermentation products from biomass

DATE-ISSUED: August 3, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Van Draanen; Arlen	Bellevue	WA		
Mello; Steven	Bedford	NH		

US-CL-CURRENT: 435/144; 435/157, 435/160, 435/161, 435/163, 435/165, 435/171, 435/267

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 22. Document ID: US 5916787 A

L5: Entry 22 of 37 File: USPT Jun 29, 1999

US-PAT-NO: 5916787
DOCUMENT-IDENTIFIER: US 5916787 A

TITLE: Ethanol production in gram-positive microbes

DATE-ISSUED: June 29, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O'Neal	Gainesville	FL		
Barbosa-Alleyne; Maria D. F.	Gainesville	FL		

US-CL-CURRENT: 435/161; 257/E21.317, 435/162, 435/163, 435/165, 435/252.31, 435/320.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 23. Document ID: US 5821093 A

L5: Entry 23 of 37 File: USPT Oct 13, 1998

US-PAT-NO: 5821093
DOCUMENT-IDENTIFIER: US 5821093 A

TITLE: Recombinant cells that highly express chromosomally-integrated heterologous genes

DATE-ISSUED: October 13, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		
Ohta; Kazuyoshi	Gainesville	FL		
Wood; Brent E.	Gainesville	FL		

US-CL-CURRENT: 435/161; 257/E21.317, 435/163, 435/252.3, 435/252.33, 536/23.2, 536/23.7, 536/24.1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc
Image

☐ 24. Document ID: US 5677154 A

L5: Entry 24 of 37 File: USPT Oct 14, 1997

US-PAT-NO: 5677154
DOCUMENT-IDENTIFIER: US 5677154 A
**** See image for Certificate of Correction ****

TITLE: Production of ethanol from biomass

DATE-ISSUED: October 14, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Van Draanen; Arlen	Haverhill	MA		
Mello; Steven	Bedford	NH		

US-CL-CURRENT: 435/163; 435/161, 435/165, 435/171, 435/267

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc
Image

☐ 25. Document ID: US 5607672 A

L5: Entry 25 of 37 File: USPT Mar 4, 1997

US-PAT-NO: 5607672
DOCUMENT-IDENTIFIER: US 5607672 A

TITLE: Replacement therapy for dental caries

DATE-ISSUED: March 4, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hillman; Jeffrey D.	Gainesville	FL		

US-CL-CURRENT: 424/50; 424/93.44, 435/252.3

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

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☐ 26. Document ID: US 5554520 A

L5: Entry 26 of 37 File: USPT Sep 10, 1996

US-PAT-NO: 5554520
DOCUMENT-IDENTIFIER: US 5554520 A

TITLE: Ethanol production by recombinant hosts

DATE-ISSUED: September 10, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fowler; David E.	Gainesville	FL		
Horton; Philip G.	Gainesville	FL		
Ben-Bassat; Arie	Gainesville	FL		

US-CL-CURRENT: 435/165; 257/E21.317, 435/162

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

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☐ 27. Document ID: US 5487989 A

L5: Entry 27 of 37 File: USPT Jan 30, 1996

US-PAT-NO: 5487989
DOCUMENT-IDENTIFIER: US 5487989 A

TITLE: Ethanol production by recombinant hosts

DATE-ISSUED: January 30, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fowler; David E.	Gainesville	FL		
Horton; Philip G.	Gainesville	FL		
Ben-Bassat; Arie	Gainesville	FL		

US-CL-CURRENT: 435/165; 257/E21.317, 435/162, 435/209, 435/252.3, 435/852

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

☐ 28. Document ID: US 5482846 A

L5: Entry 28 of 37 File: USPT Jan 9, 1996

US-PAT-NO: 5482846
DOCUMENT-IDENTIFIER: US 5482846 A

TITLE: Ethanol production in Gram-positive microbes

DATE-ISSUED: January 9, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O'Neal	Gainesville	FL		
Barbosa-Alleyne; Maria D. F.	Gainesville	FL		

US-CL-CURRENT: 435/161; 257/E21.317, 435/163, 435/252.31

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

☐ 29. Document ID: US 5424202 A

L5: Entry 29 of 37 File: USPT Jun 13, 1995

US-PAT-NO: 5424202
DOCUMENT-IDENTIFIER: US 5424202 A

TITLE: Ethanol production by recombinant hosts

DATE-ISSUED: June 13, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingram; Lonnie O.	Gainesville	FL		
Beall; David S.	Gainesville	FL		
Burchhardt; Gerhard F. H.	Gainesville	FL		
Guimaraes; Walter V.	Vicosa			BR
Ohta; Kazuyoshi	Miyazaki			JP
Wood; Brent E.	Gainesville	FL		
Shanmugam; Keelnatham T.	Gainesville	FL		

US-CL-CURRENT: 435/161; 257/E21.317, 435/165, 435/252.3, 435/320.1, 435/847, 435/854

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

☐ 30. Document ID: US 5270175 A

L5: Entry 30 of 37 File: USPT Dec 14, 1993

US-PAT-NO: 5270175

DOCUMENT-IDENTIFIER: US 5270175 A

TITLE: Methods and compositions for producing metabolic products for algae

DATE-ISSUED: December 14, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Moll; Benjamin A.	Berkeley	CA		

US-CL-CURRENT: 435/41; 435/161, 435/320.1, 435/410, 435/69.1, 435/70.1, 435/946, 536/23.2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw. Desc | Image

Generate Collection | Print

Terms	Documents
L4 and (gene or dna)	37

Display Format: - Change Format

Previous Page Next Page

L5: Entry 27 of 37 File: USPT Jan 30, 1996

US-PAT-NO: 5487989
DOCUMENT-IDENTIFIER: US 5487989 A

TITLE: Ethanol production by recombinant hosts

DATE-ISSUED: January 30, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fowler; David E.	Gainesville	FL		
Horton; Philip G.	Gainesville	FL		
Ben-Bassat; Arie	Gainesville	FL		

US-CL-CURRENT: 435/165; 257/E21.317, 435/162, 435/209, 435/252.3, 435/852

CLAIMS:

What is claimed is:

1. A method for producing ethanol from cellulose-containing biomass, comprising the steps of:

A. contacting, in a first reaction vessel, said biomass with a polysaccharase such that cellulose in said biomass is broken down into simpler oligosaccharides and/or monosaccharides,

wherein said contacting is carried out at a temperature of from about 40.degree. C. to about 60.degree. C. and a pH of from about 4.5 to about 5.0;

B. producing from said first reaction vessel a sugar solution comprising said simpler oligosaccharides and/or monosaccharides;

C. introducing said sugar solution into a fermentor which comprises gram-negative enteric recombinant host microorganisms capable of fermenting said simpler oligosaccharides and/or monosaccharides into ethanol; and

D. fermenting said simpler oligosaccharides and/or monosaccharides into ethanol at a temperature of from about 30.degree. C. to about 35.degree. C. and a pH of about 6.0,

wherein said microorganism is capable of fermenting monosaccharides into ethanol, and comprises a recombinant host, other than Escherichia coli, comprising a first heterologous DNA coding for alcohol dehydrogenase and pyruvate decarboxylase, wherein said heterologous DNA is from Zymomonas mobilis and wherein said host expresses said heterologous DNA at a sufficient functional level so as to facilitate the production of ethanol as the primary fermentation product by said host,

wherein said host also produces a polysaccharase, and said host further comprises a second heterologous DNA segment, the expression product of which is said polysaccharase.

2. A method according to claim 1, wherein a first stream from said fermentor is withdrawn and used to cool the sugar solution produced in Step B.

3. A method according to claim 2, wherein said first stream is introduced into said first vessel after cooling said sugar solution produced in Step B.

4. A method according to claim 1, wherein the sugar solution produced in Step B is passed through an ultrafiltration unit having an upper molecular weight cut-off ultrafiltration membrane to obtain an ultrafiltration product solution and a second solution,

said ultrafiltration product solution comprising predominantly molecules having a molecular weight below the molecular weight cut-off of said ultrafiltration membrane, said product solution comprising at least some of said oligosaccharides and/or monosaccharides obtained from Step B, and

said second solution comprising predominantly molecules having a molecular weight above the molecular weight cut-off of said ultrafiltration membrane.

5. A method according to claim 4, wherein said product solution predominantly comprises molecules having a molecular weight of less than about 25,000.

6. A method according to claim 4, wherein the ultrafiltration product solution is subjected to reverse osmosis to obtain a first stream comprising predominantly water and a second stream comprising at least some of the oligosaccharides and/or monosaccharides.

7. A method according to claim 6, wherein said stream comprising predominantly water is recycled to the first reaction vessel.

8. A method according to claim 1, wherein the sugar solution produced in Step B is subjected to reverse osmosis to obtain a first stream comprising predominantly water and a second stream comprising at least some of the oligosaccharides and/or monosaccharides.

9. A method according to claim 8, wherein said stream comprising predominantly water is recycled to the first reaction vessel.

10. A method according to claim 1, wherein the contacting in said first reaction vessel is carried out at a temperature of from about 50.degree. C. to about 60.degree. C.

11. A method according to claim 1, wherein the contacting in said first reaction vessel is carried out at a temperature of from about 50.degree. C. to about 55.degree. C.

12. A method according to claim 1, wherein enzymes which break down cellulose into simpler oligosaccharides and/or monosaccharides are added to said fermentor.

13. The method of claim 1, wherein said host is selected from the group consisting of Erwinia, Klebsiella and Xanthomonas.

14. The method of claim 13, wherein said host is selected from the group consisting of Erwinia and Klebsiella.

15. The method of claim 14, wherein said host is Klebsiella oxytoca M5A1(pLOI555), ATCC 68564, deposited Mar. 14, 1991.

16. The method of claim 1, wherein said host has been transformed with a plasmid comprising genes coding for alcohol dehydrogenase and pyruvate decarboxylase, wherein said host expresses said genes to produce alcohol dehydrogenase and pyruvate decarboxylase at a sufficient functional level to facilitate the production of ethanol as the primary fermentation product by said host.

17. The method of claim 16, wherein said plasmid comprises Zymomonas mobilis

genes coding for alcohol dehydrogenase and pyruvate decarboxylase.

18. The method of claim 16, wherein said plasmid further comprises a lac promoter which directs the expression of said genes coding for alcohol dehydrogenase and pyruvate decarboxylase.

19. The method of claim 16, wherein said plasmid has been designated pLOI555.

20. The method of claim 1, wherein said polysaccharase is a cellulolytic enzyme.

21. The method of claim 20, wherein said polysaccharase is selected from the group consisting of an endoglucanase, cellobiohydrolase, .beta.-glucosidase, and .beta.-glucanase.

22. The method of claim 21, wherein polysaccharase is an expression product of a celD gene.

23. The method of claim 22, wherein said celD gene is derived from Clostridium thermocellum.

24. The method of claim 21, wherein said polysaccharase is at least partially secreted by said host.

25. The method of claim 21, wherein said polysaccharase is accumulated in said host.

26. A method for producing ethanol from cellulose-containing biomass, comprising the steps of:

A. contacting, in a first reaction vessel, said biomass with a polysaccharase such that oligosaccharide in said biomass is broken down into simpler oligosaccharides and/or monosaccharides,

wherein said contacting is carried out at a temperature of from about 40.degree. C. to about 60.degree. C. and a pH of from about 4.5 to about 5.0;

B. producing from said first reaction vessel a sugar solution comprising said simpler oligosaccharides and/or monosacchrides;

C. introducing said sugar solution into a fermentor which comprises gram-negative enteric recombinant host microorganisms capable of fermenting said simpler oligosaccharides and/or monosaccharides into ethanol; and

D. fermenting said simpler oligosaccharides and/or monosaccharides into ethanol at a temperature of from about 30.degree. C. to about 35.degree. C. and a pH of about 6.0,

wherein said microorganism is capable of fermenting both monosaccharides and oligosaccharides into ethanol, and said microorganism further comprises a recombinant host comprising first heterologous DNA from Zymomonas mobilis coding for alcohol dehydrogenase and pyruvate decarboxylase, respectively, wherein said host

(A) further comprises genes coding for proteins which enable said host to transport and metabolize an oligosaccharide, and

(B) expresses said genes and said heterologous DNA at a level such that ethanol is produced as the primary fermentation product by said host from the metabolism of said oligosaccharide, and

wherein said recombinant host also produces a polysaccharase, and said host further comprises a second heterologous DNA segment, the expression product of which is said polysaccharase.

27. The method of claim 26, wherein said recombinant host is selected from the

group consisting of Erwinia and Klebsiella.

28. The method of claim 27, wherein said recombinant host is Klebsiella oxytoca M5A1(pLOI555), ATCC 68564, deposited Mar. 14, 1991.

29. The method of claim 26, wherein said oligosaccharide is selected from the group consisting of dimers and trimers.

30. The method of claim 26, wherein said polysaccharase is a cellulolytic enzyme.

31. The method of claim 30, wherein said polysaccharase comprises the expression product of a cellulase gene of Cellulomonas fimi, and said host secretes at least some of said polysaccharase.

32. The method of claim 26, wherein said polysaccharase is selected from the group consisting of an endoglucanase, cellobiohydrolase, .beta.-glucosidase, .beta.-glucanase and hemicellulase, arabinosidase.

33. The method of claim 32, wherein said polysaccharase is an expression product of a celD gene.

34. The method of claim 33, wherein said celD gene is derived from Clostridium thermocellum.

35. The method of claim 26, wherein said host further comprises an additional heterologous DNA segment, the expression product of which is a protein involved in the transport of mono- and/or oligosaccharides into the recombinant host.

36. The method of claim 26, wherein said polysaccharase is at least partially secreted by said host.

37. The method of claim 26, wherein said polysaccharase is accumulated in said host.

38. The method of claim 37, wherein said host further comprises an additional heterologous DNA segment, the expression product of which is an additional polysaccharase that is at least partially secreted by said host.

39. The method of claim 38, wherein said additional polysaccharase comprises the expression product of a cellulase gene of Cellulomonas fimi.

WEST Search History

DATE: Friday, July 25, 2003

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT,PGPB,JPAB,EPAB,DWPI; PLUR=YES; OP=ADJ			
L5	L4 and (gene or dna)	37	L5
L4	L3 and zymomonas mobilis	37	L4
L3	ethanol production and alcohol dehydrogenase and pyruvate decarboxylase	53	L3
DB=USPT; PLUR=YES; OP=ADJ			
L2	5482846	6	L2
L1	5916787	1	L1

END OF SEARCH HISTORY

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                                                       ENTRY    SESSION
FULL ESTIMATED COST                                     0.21       0.21

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=> s alcohol dehydrogenase and pyruvate decarboxylase and (dna or gene) and ethanol product
L1          104 ALCOHOL DEHYDROGENASE AND PYRUVATE DECARBOXYLASE AND (DNA OR
                GENE) AND ETHANOL PRODUCT?

=> dup rem l1
PROCESSING COMPLETED FOR L1
L2           72 DUP REM L1 (32 DUPLICATES REMOVED)

=> s l2 and zymomonas mobilis
L3           55 L2 AND ZYMOMONAS MOBILIS

=> focus l3
PROCESSING COMPLETED FOR L3
L4           55 FOCUS L3 1-

=> s l4 and 1988-1995/py
   5 FILES SEARCHED...
L5           29 L4 AND 1988-1995/PY

=> d l5 1-10 ibib ab

L5   ANSWER 1 OF 29     MEDLINE on STN
ACCESSION NUMBER:    91282482     MEDLINE
DOCUMENT NUMBER:     91282482   PubMed ID: 2059047
TITLE:               Genetic improvement of Escherichia coli for ethanol
                     production: chromosomal integration of
                     Zymomonas mobilis genes encoding
                     pyruvate decarboxylase and
                     alcohol dehydrogenase II.
AUTHOR:              Ohta K; Beall D S; Mejia J P; Shanmugam K T; Ingram L O
CORPORATE SOURCE:    Department of Microbiology and Cell Science, University of
                     Florida, Gainesville 32611.
CONTRACT NUMBER:     GM37403 (NIGMS)
SOURCE:              APPLIED AND ENVIRONMENTAL MICROBIOLOGY, (1991 Apr)
                     57 (4) 893-900.
                     Journal code: 7605801. ISSN: 0099-2240.
PUB. COUNTRY:        United States
DOCUMENT TYPE:       Journal; Article; (JOURNAL ARTICLE)
LANGUAGE:            English
FILE SEGMENT:        Priority Journals
ENTRY MONTH:         199107
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ENTRY DATE: Entered STN: 19910818
Last Updated on STN: 20000303
Entered Medline: 19910729

AB **Zymomonas mobilis** genes for **pyruvate decarboxylase** (pdc) and **alcohol dehydrogenase** II (adhB) were integrated into the Escherichia coli chromosome within or near the pyruvate formate-lyase **gene** (pfl). Integration improved the stability of the Z. mobilis genes in E. coli, but further selection was required to increase expression. Spontaneous mutants were selected for resistance to high level of chloramphenicol that also expressed high levels of the Z. mobilis genes. Analogous mutants were selected for increased expression of **alcohol dehydrogenase** on aldehyde indicator plates. These mutants were functionally equivalent to the previous plasmid-based strains for the fermentation of xylose and glucose to ethanol. Ethanol concentrations of 54.4 and 41.6 g/liter were obtained from 10% glucose and 8% xylose, respectively. The efficiency of conversion exceeded theoretical limits (0.51 g of ethanol/g of sugar) on the basis of added sugars because of the additional production of ethanol from the catabolism of complex nutrients. Further mutations were introduced to inactivate succinate production (frd) and to block homologous recombination (recA).

L5 ANSWER 2 OF 29 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1995:992753 CAPLUS
DOCUMENT NUMBER: 124:28129
TITLE: **Ethanol production** with recombinant Gram-positive microbes expressing exogenous **pyruvate decarboxylase** and **alcohol dehydrogenase** genes
INVENTOR(S): Ingram, Lonnie O'Neal; Barbosa-Alleyne, Maria de F. S.
PATENT ASSIGNEE(S): University of Florida, USA
SOURCE: PCT Int. Appl., 33 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 10
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
WO 9527064	A1	19951012	WO 1995-US4012	19950330	<--
W: AM, AU, BB, BG, BR, BY, CA, CN, CZ, EE, FI, GE, HU, IS, JP, KG, KP, KR, KZ, LK, LR, LT, LV, MD, MG, MN, MW, MX, NO, NZ, PL, RO, RU, SG, SI, SK, TJ, TT, UA, UZ, VN					
RW: KE, MW, SD, SZ, UG, AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG					
US 5482846	A	19960109	US 1994-220072	19940330	
AU 9522034	A1	19951023	AU 1995-22034	19950330	<--

PRIORITY APPLN. INFO.:

US 1994-220072	A	19940330
US 1988-239099	B2	19880831
US 1989-352062	A2	19890515
US 1990-624227	B2	19901207
US 1991-670821	B2	19910318
US 1992-846344	A2	19920306
US 1992-946290	A2	19920917
US 1993-260517	A2	19930305
WO 1995-US4012	W	19950330

AB The subject invention concerns the transformation of Gram-pos. bacteria with heterologous genes which confer upon these microbes the ability to produce ethanol as a fermn. product. Specifically exemplified is the transformation of bacteria with genes, obtainable from **Zymomonas mobilis**, which encode **pyruvate decarboxylase** and alc. dehydrogenase. A recombinant Bacillus subtilis expressing Z. mobilis pdc and adhB genes was created.

L5 ANSWER 3 OF 29 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1994:433306 CAPLUS
DOCUMENT NUMBER: 121:33306
TITLE: Processes for **ethanol production**
INVENTOR(S): Fowler, David E.; Horton, Philip G.; Ben-Bassat, Arie
PATENT ASSIGNEE(S): Bioenergy International, l.c., USA
SOURCE: PCT Int. Appl., 172 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 10
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9406924	A1	19940331	WO 1993-US8558	19930917 <--
W: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN				
RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG				
US 5487989	A	19960130	US 1992-946290	19920917
US 5554520	A	19960910	US 1993-26051	19930305
AU 9351598	A1	19940412	AU 1993-51598	19930917 <--

PRIORITY APPLN. INFO.:

US 1992-946290	A	19920917
US 1993-26051	A	19930305
US 1988-239099	B2	19880831
US 1989-352062	A	19890515
US 1990-624277	B2	19901207
US 1991-670821	B2	19910318
US 1992-846344	A2	19920306
WO 1993-US8558	W	19930917

AB Novel plasmids comprising genes which code for alc. dehydrogenase and **pyruvate decarboxylase** are described. Also described are recombinant hosts which have been transformed with genes coding for alc. dehydrogenase and **pyruvate decarboxylase**. By virtue of their transformation with these genes, the recombinant hosts are capable of producing significant amts. of ethanol as a fermn. product. Also disclosed are methods for increasing the growth of recombinant hosts and methods for reducing the accumulation of undesirable metabolic products in the growth medium of these hosts. Also disclosed are recombinant hosts capable of producing significant amts. of ethanol as a fermn. product of oligosaccharides and plasmids comprising genes encoding polysaccharides, in addn. to the genes described above which code for alc. dehydrogenase and **pyruvate decarboxylase**. Further, methods are described for producing ethanol from oligomeric feedstock using the recombinant hosts described above. Also provided is a method for enhancing the prodn. of functional proteins in a recombinant host comprising overexpressing an adhB **gene** in the host. Further provided are process designs for fermenting oligosaccharide-contg. biomass to ethanol.

L5 ANSWER 4 OF 29 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1992:649986 CAPLUS
DOCUMENT NUMBER: 117:249986
TITLE: **Ethanol production** by by bacteria carrying foreign genes for **alcohol dehydrogenase** and **pyruvate decarboxylase**
INVENTOR(S): Ingram, Lonnie O.; Beall, David S.; Burchhardt, Gerhard F. H.; Guimaraes, Walter V.; Ohta, Kazuyoshi; Wood, Brent E.; Shanmugam, Keelnatham T.; Fowler, David A.; Ben-Bassat, Arie
PATENT ASSIGNEE(S): University of Florida, USA; Bioenergy International,

L.C.
SOURCE: PCT Int. Appl., 153 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 10
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9216615	A1	19921001	WO 1992-US1807	19920318 <--
W: AT, AU, BB, BG, BR, CA, CH, CS, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, PL, RO, RU, SD, SE, US				
RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FR, GA, GB, GN, GR, IT, LU, MC, ML, MR, NL, SE, SN, TD, TG				
US 5424202	A	19950613	US 1992-846344	19920306 <--
AU 9217794	A1	19921021	AU 1992-17794	19920318 <--
AU 672748	B2	19961017		
CN 1070424	A	19930331	CN 1992-101877	19920318 <--
CN 1065915	B	20010516		
EP 576621	A1	19940105	EP 1992-910933	19920318 <--
EP 576621	B1	20010228		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, MC, NL, SE				
BR 9205782	A	19940726	BR 1992-5782	19920318 <--
AT 199389	E	20010315	AT 1992-910933	19920318
NO 9303178	A	19931108	NO 1993-3178	19930907 <--
CN 1342773	A	20020403	CN 2000-131779	20001020

PRIORITY APPLN. INFO.:

US 1991-670821	A	19910318
US 1992-846344	A	19920306
US 1988-239099	B2	19880831
US 1989-352062	A2	19890515
US 1990-624277	B2	19901207
WO 1992-US1807	A	19920318

AB Bacterial hosts, excluding Escherichia coli, expressing heterologous genes for alc. dehydrogenase (I) and **pyruvate decarboxylase** (II) are used for manuf. of EtOH. II is used to prevent accumulation of acid metabolites. Plasmids, e.g. pLOI555 carrying genes for I and II of **Zymomonas mobilis** driven by the lac promoter, are provided for prepn. of the host. The method is further improved by transforming the host with genes for proteins that facilitate transport and metab. of oligosaccharides, e.g., of C5-6 sugars, which host is, preferably, also expressing a heterologous **gene** for a polysaccharase such as a cellulolytic enzyme, a xylanolytic enzyme, or a starch-degrading enzyme. These hosts also preferably express heterologous genes for polysaccharide- degrading enzymes (e.g. those degrading cellulose, xylans, or starch). A cost-effective fermn. process for manufg. EtOH from oligosaccharide feedstocks using a single, genetically engineered microorganism is also disclosed. An ethanologenic strain Klebsiella oxytoca M5A1(pLOI555) was prepd. and was further transformed with plasmid pLOI2003 encoding xylanase (**gene** xynZ) and xylosidase (**gene** xylB) of Clostridium thermocellum to obtain a transformant capable of converting xylan to EtOH.

L5 ANSWER 5 OF 29 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1992:19704 CAPLUS
DOCUMENT NUMBER: 116:19704
TITLE: Metabolic engineering of Klebsiella oxytoca M5A1 for **ethanol production** from xylose and glucose
AUTHOR(S): Ohta, Kazuyoshi; Beall, D. S.; Mejia, J. P.; Shanmugam, K. T.; Ingram, L. O.
CORPORATE SOURCE: Dep. Microbiol. Cell Sci., Univ. Florida, Gainesville, FL, 32611-0100, USA
SOURCE: Applied and Environmental Microbiology (**1991**), 57(10), 2810-15

CODEN: AEMIDF; ISSN: 0099-2240
DOCUMENT TYPE: Journal
LANGUAGE: English
AB The efficient diversion of pyruvate from normal fermentative pathways to ethanol prodn. in K. oxytoca M5A1 requires the expression of **Zymomonas mobilis** genes encoding both **pyruvate decarboxylase** and alc. dehydrogenase. Final ethanol concns. obtained with the best recombinant, strain M5A1 (pLOI555), were in excess of 40 g/L with an efficiency of 0.48 g of ethanol (xylose) and 0.50 g of ethanol (glucose) per g of sugar, as compared with a theor. max. of 0.51 g ethanol/g sugar. The maximal volumetric productivity per h for both sugars was 2.0 g/L. This volumetric productivity with xylose is almost twice that previously obtained with ethanologenic Escherichia coli. Succinate was also produced as a minor product during fermn.

L5 ANSWER 6 OF 29 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1991:534238 CAPLUS
DOCUMENT NUMBER: 115:134238
TITLE: **Ethanol production** using recombinant mutant Escherichia coli
INVENTOR(S): Ingram, Lonnie O.; Clark, David P.
PATENT ASSIGNEE(S): University of Florida, USA
SOURCE: U.S., 5 pp. Cont.-in-part of U.S. Ser. No. 239,099, abandoned.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 10
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 5028539	A	19910702	US 1988-274075	19881121 <--

PRIORITY APPLN. INFO.: US 1988-239099 B2 19880831
AB Escherichia coli with mutations which result in alc. dehydrogenase hyperprodn. are transformed with the **Zymomonas mobilis pyruvate decarboxylase gene**. These microorganisms can be used to manuf. EtOH. The recombinant mutants grew to higher cell d. than did the parent strain. The increase in d. and the extent to which EtOH accumulated in the medium correlated with the level of expression of the decarboxylase.

L5 ANSWER 7 OF 29 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1990:422259 CAPLUS
DOCUMENT NUMBER: 113:22259
TITLE: **Ethanol production** by genetically engineered Escherichia coli strains
INVENTOR(S): Ingram, Lonnie O.; Conway, Tyrrell; Alterthum, Flavio
PATENT ASSIGNEE(S): University of Florida, USA
SOURCE: PCT Int. Appl., 37 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 10
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9002193	A1	19900308	WO 1989-US3753	19890829 <--
W: BG, BR, HU, JP, KP, KR, RO, SU				
RW: AT, BE, CH, DE, FR, GB, IT, LU, NL, SE				
US 5000000	A	19910319	US 1989-352062	19890515 <--
EP 431047	A1	19910612	EP 1989-909966	19890829 <--
R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE				
HU 60328	A2	19920828	HU 1989-5771	19890829 <--

JP 05502366 T2 19930428 JP 1989-509287 19890829 <--
CA 1335430 A1 19950502 CA 1989-609829 19890830 <--
PRIORITY APPLN. INFO.: US 1988-239099 A 19880831
US 1989-352062 A 19890515
WO 1989-US3753 W 19890829

AB **DNA** fragments comprising alc. dehydrogenase and **pyruvate decarboxylase** (enzymes of the ethanologenic pathway) genes were isolated from **Zymomonas mobilis** and cloned in E. coli cells using different plasmids as expression vehicles. Both enzymes were expressed at high level and this resulted in elevated EtOH productivity. Using 12% glucose, 12% lactose, and 8% xylose as substrates, the EtOH yields in E. coli were 58, 52, and 42 g/L, resp., or 95, 80, and 102%, resp., of theor.

L5 ANSWER 8 OF 29 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 1993:73335 BIOSIS
DOCUMENT NUMBER: PREV199395037835
TITLE: Use of the tac promoter and lacI-q for the controlled expression of **Zymomonas mobilis** fermentative genes in Escherichia coli and **Zymomonas mobilis**.
AUTHOR(S): Arfman, N.; Worrell, V.; Ingram, L. O. (1)
CORPORATE SOURCE: (1) Dep. Microbiol. Cell Sci., University Florida, Gainesville, Fla. 32611
SOURCE: Journal of Bacteriology, (1992) Vol. 174, No. 22, pp. 7370-7378.
ISSN: 0021-9193.
DOCUMENT TYPE: Article
LANGUAGE: English

AB The **Zymomonas mobilis** genes encoding **alcohol dehydrogenase** I (adhA), **alcohol dehydrogenase** II (adhB), and **pyruvate decarboxylase** (pdc) were overexpressed in Escherichia coli and Z. mobilis by using a broad-host-range vector containing the tac promoter and the lacI-q repressor **gene**. Maximal IPTG (isopropyl-beta-D-thiogalactopyranoside) induction of these plasmid-borne genes in Z. mobilis resulted in a 35-fold increase in **alcohol dehydrogenase** I activity, a 16.7-fold increase in **alcohol dehydrogenase** II activity, and a 6.3-fold increase in **pyruvate decarboxylase** activity. Small changes in the activities of these enzymes did not affect glycolytic flux in cells which are at maximal metabolic activity, indicating that flux under these conditions is controlled at some other point in metabolism. Expression of adhA, adhB, or pdc at high specific activities (above 8 IU/mg of cell protein) resulted in a decrease in glycolytic flux (negative flux control coefficients), which was most pronounced for pyruvate decarboxylate. Growth rate and flux are imperfectly coupled in this organism. Neither a twofold increase in flux nor a 50% decline from maximal flux caused any immediate change in growth rate. Thus, the rates of biosynthesis and growth in this organism are not limited by energy generation in rich medium.

L5 ANSWER 9 OF 29 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 1988:481687 BIOSIS
DOCUMENT NUMBER: BA86:112997
TITLE: ALCOHOL PRODUCTION FROM GLUCOSE AND XYLOSE USING ESCHERICHIA-COLI CONTAINING **ZYMOMONAS-MOBILIS** GENES.
AUTHOR(S): NEALE A D; SCOPES R K; KELLY J M
CORPORATE SOURCE: DEP. BIOCHEMISTRY, LA TROBE UNIV., BUNDOORA, VICTORIA 3083, AUSTRALIA.
SOURCE: APPL MICROBIOL BIOTECHNOL, (1988) 29 (2-3), 162-167.
CODEN: AMBIDG. ISSN: 0175-7598.
FILE SEGMENT: BA; OLD
LANGUAGE: English

AB An Escherichia coli strain containing a recombinant plasmid encoding the **pyruvate decarboxylase** and **alcohol dehydrogenase** genes from **Zymomonas mobilis** metabolized glucose and xylose to near theoretical yields of ethanol. Enzyme activity measurements indicate high expression levels of both plasmid-encoded Zymomonas proteins in the recombinant E. coli. The expression in E. coli is under the control of a promoter in the Zymomonas sequence upstream of the **pyruvate decarboxylase gene**. The maximum ethanol level, using 4% glucose as substrate, was 1.8% (w/v) in anaerobic conditions. In aerobic conditions the natural repression of E. coli alcohol dehyrogenase results in less **ethanol production** from clones expressing only Zymomas **pyruvate decarboxylase**.

L5 ANSWER 10 OF 29 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 1988:154499 BIOSIS
DOCUMENT NUMBER: BA85:78152
TITLE: EXPRESSION OF DIFFERENT LEVELS OF ETHANOLOGENIC ENZYMES FROM **ZYMOMONAS-MOBILIS** IN RECOMBINANT STRAINS OF ESCHERICHIA-COLI.
AUTHOR(S): INGRAM L O; CONWAY T
CORPORATE SOURCE: DEP. MICROBIOLOGY AND CELL SCIENCE, UNIVERSITY FLORIDA, GAINESVILLE, FLA. 32611.
SOURCE: APPL ENVIRON MICROBIOL, (1988) 54 (2), 397-404. CODEN: AEMIDF. ISSN: 0099-2240.
FILE SEGMENT: BA; OLD
LANGUAGE: English
AB The expression of **Zymomonas mobilis** genes encoding **pyruvate decarboxylase** and **alcohol dehydrogenase** II in Escherichia coli converted this organism from the production of organic acids to the production of ethanol. Ethanol was produced during both anaerobic and aerobic growth. The extent to which these ethanologenic enzymes were expressed correlated with the extent of **ethanol production**. The replacement of organic acids with ethanol as a metabolic product during aerobic and anaerobic growth resulted in dramatic increases in final cell density, indicating that these acids (and the associated decline in pH) are more damaging than the production of ethanol. Of the plasmids examined, the best plasmid for growth and **ethanol production** expressed **pyruvate decarboxylase** and **alcohol dehydrogenase** II at levels of 6.5 and 2.5 IU/mg of total cell protein, respectively.

=> s l4 and 1984-1987/py
L6 1 L4 AND 1984-1987/PY

=> d l6 ibib ab

L6 ANSWER 1 OF 1 MEDLINE on STN
ACCESSION NUMBER: 88105387 MEDLINE
DOCUMENT NUMBER: 88105387 PubMed ID: 3322191
TITLE: Genetic engineering of **ethanol production** in Escherichia coli.
AUTHOR: Ingram L O; Conway T; Clark D P; Sewell G W; Preston J F
CORPORATE SOURCE: Department of Microbiology and Cell Science, University of Florida, Gainesville 32611.
SOURCE: APPLIED AND ENVIRONMENTAL MICROBIOLOGY, **(1987 Oct)** 53 (10) 2420-5. Journal code: 7605801. ISSN: 0099-2240.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198802

ENTRY DATE: Entered STN: 19900305
Last Updated on STN: 19980206
Entered Medline: 19880202

AB The genes encoding essential enzymes of the fermentative pathway for **ethanol production** in **Zymomonas mobilis**, an obligately ethanologenic bacterium, were inserted into Escherichia coli under the control of a common promoter. **Alcohol dehydrogenase** II and **pyruvate decarboxylase** from Z. mobilis were expressed at high levels in E. coli, resulting in increased cell growth and the production of ethanol as the principal fermentation product from glucose. These results demonstrate that it is possible to change the fermentation products of an organism, such as E. coli, by the addition of genes encoding appropriate enzymes which form an alternative system for the regeneration of NAD+.

=> d his

(FILE 'HOME' ENTERED AT 10:44:44 ON 25 JUL 2003)

FILE 'MEDLINE, CAPLUS, BIOSIS, EMBASE, BIOTECHDS, SCISEARCH' ENTERED AT 10:45:30 ON 25 JUL 2003

L1 104 S ALCOHOL DEHYDROGENASE AND PYRUVATE DECARBOXYLASE AND (DNA OR
L2 72 DUP REM L1 (32 DUPLICATES REMOVED)
L3 55 S L2 AND ZYMOMONAS MOBILIS
L4 55 FOCUS L3 1-
L5 29 S L4 AND 1988-1995/PY
L6 1 S L4 AND 1984-1987/PY

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